# A Nutrient Trading Tool for the Chesapeake Bay

Suzie Greenhalgh, Jenny Guiling & Mindy Selman





# N and P Discharges

Source	Nitrogen	Phosphorus
Total non-point discharges	6,663	1,658
Total point sources	1,495	330
Total discharge (point + non-point)	8,158	2,015
Non-point as a percentage of total	82	84

Source: Carpenter et al., 1998

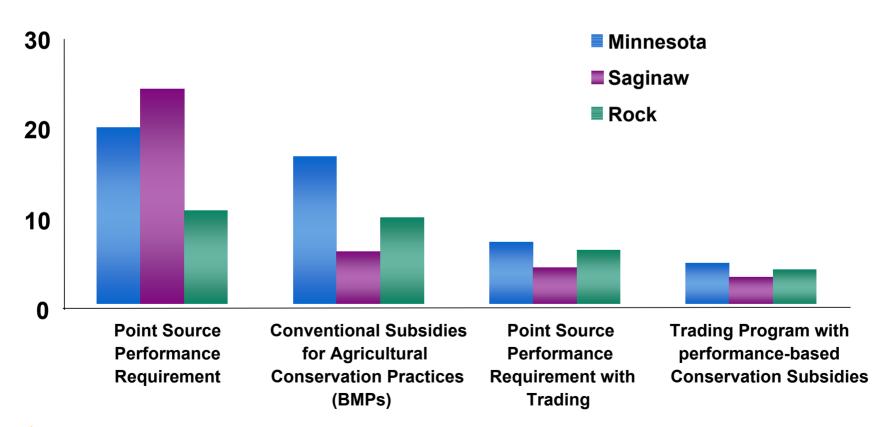
Units: '000 metric tons per year





# Cost for Phosphorus Control Under Different Policies

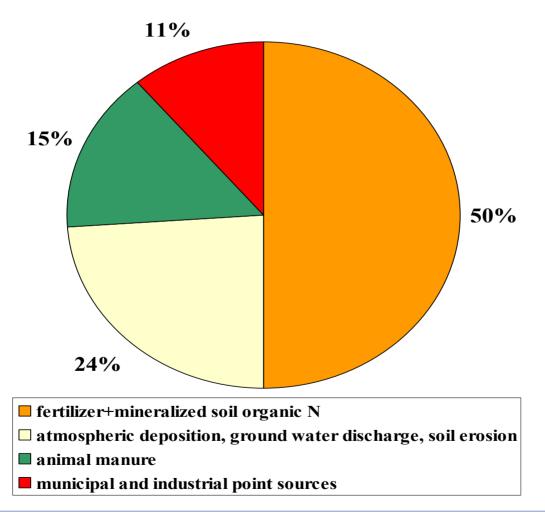
(US\$ per pound of phosphorus removed)



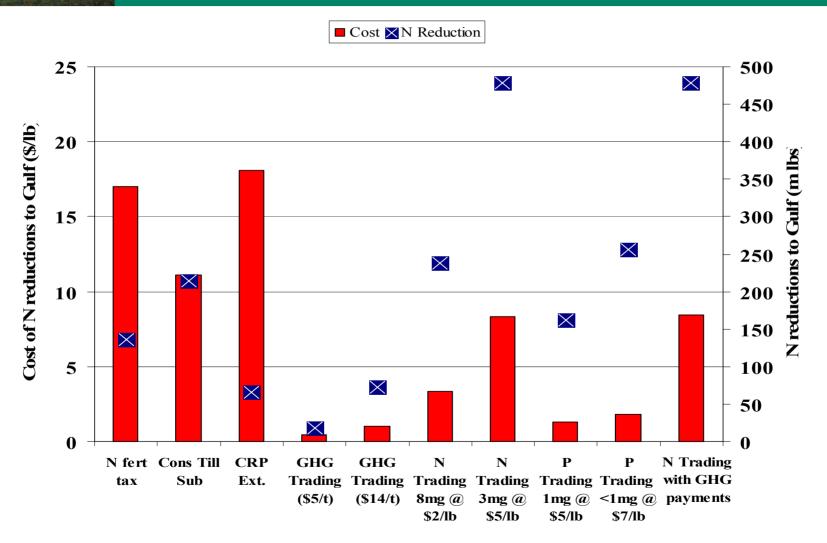




# Hypoxia: Sources of N in MRB



## **Cost-effectiveness of Policy Options**







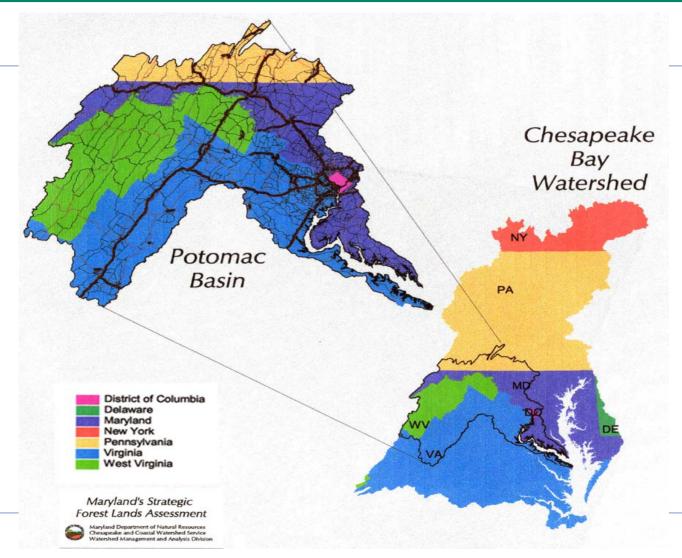
## Why NutrientNet?

# **NutrientNet** was created to build a nutrient trading market place which:

- Provides standardized calculation of reductions;
- Provides estimates of cost and effectiveness of potential trades;
- Allows potential market participants to identify each other;
- Links to a trading registry which records trades and monitors compliance.









#### **Baseline load estimation for NPS:**

- Calculations based on CBWM and Nutrient Management Yardstick
- Baseline loading is equal to the total nitrogen inputs less the nitrogen that is removed via volatilization and uptake.

Nitrogen In	Nitrogen Out
Fertilizer	Plant uptake
Deposition	Volatilization
Irrigation	
Fixation	



#### **NPS Load reductions:**

Agricultural sources can evaluate several BMPs to determine total nitrogen reductions and relative cost-effectiveness.

#### BMPs include:

- Filter strips
- Cover crops
- Land conversion
- Conservation tillage

- Manure management
- Roof runoff controls
- Streambank fencing



#### Baseline and reduction estimates for PS

- Baseline loadings are based on actual permitted load
- Point Sources have the option to upgrade to meet or exceed their permitted load, or to purchase credits.
- Credits generated depend on location in watershed



#### **Tradable credits**

- Baseline loading Mitigation = Reductions
- Conversion of reductions to credits depends on the rules of the program, e.g.:
  - Trading ratio
  - Cost share
  - Attenuation factor



#### Other Applications of NutrientNet

- Reverse Auction
- Credit Bank
- Registry & Electronic Bulletin Board



## Conestoga Reverse Auction

#### What is a reverse auction?

- Sellers compete to supply buyers with the specified good or service.
- Sellers bid prices down.
- Used in markets with multiple sellers and one buyer.



## Conestoga Reverse Auction

- PEC allocated \$490K in CIGP funds to purchase P reductions in from 3 reverse auctions.
- NutrientNet NPS estimation tool used to estimate cost-effectiveness of BMPs.
- NutrientNet marketplace modified to rank bids in order of cost-effectiveness.



# Conestoga Reverse Auction - Results

Bids	Proposed BMP	Price (\$) (Total cost)	Annual Reduction (lbs P/yr)	Total Reduction (lbs P/project life)	Phosphorus reduction price (\$/lb)
1	Barnyard Runoff Control w/stacking pad	\$22,594 (\$60,653)	236	3537	\$6.39
2	Roof runoff control	\$2,153 (\$2,691)	11	165	\$13.06
3	Terraces	\$8,409 (\$11,213)	50	502	\$16.75
4	Waterways	\$2,063 (\$2,750)	6.4	64	\$32.26
5	Terraces	\$1,485 (\$1980)	2.2	22	\$66.29
6	Waterway	\$1,650 (\$2,200)	1.6	16	\$103.06
7	Waterway	\$1,705 (\$1,279)	1.1	11	\$113.67
Total		\$40,014		4317	\$9.27 (average \$/lb P)





#### Kalamazoo Credit Bank

- *NutrientNet* will be used to evaluate & purchase NPS P reductions based on cost-effectiveness.
- Reductions will be aggregated by a bank in order to provide a reserve of credits for future trades.
- Revenues from credit purchases will be used to fund additional BMPs in the watershed.



## Kalamazoo Registry

#### The Registry will:

- Interface directly with *NutrientNet*
- Will track credit generation and completed trades conducted through *NutrientNet*
- Will allow users to access publicly available registry information via *NutrientNet*



#### Thank You

#### **Contact Information**

Suzie Greenhalgh: suzieg@wri.org

Mindy Selman: mselman@wri.org

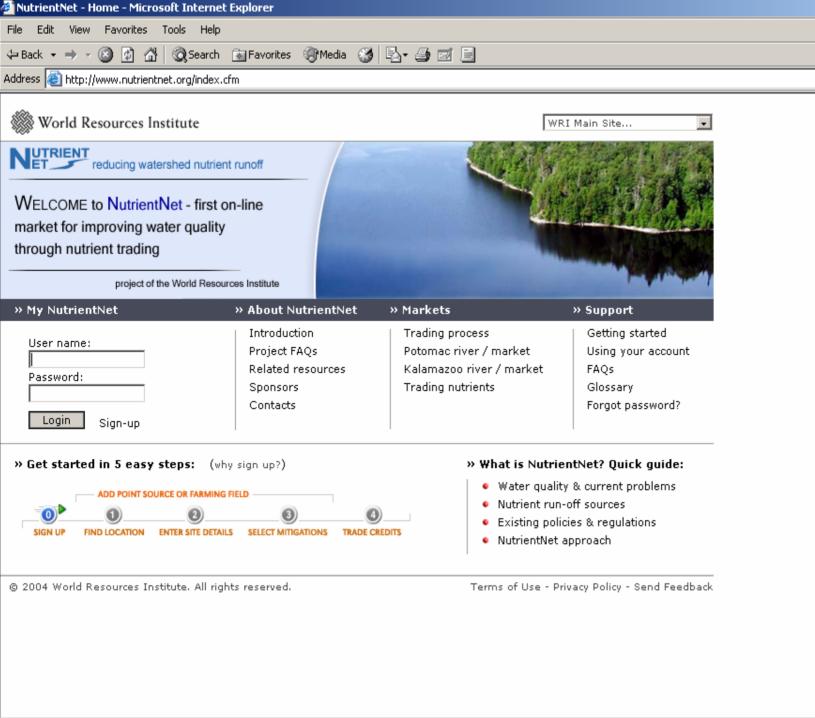
Jenny Guiling: jguiling@wri.org





#### Walkthrough of NutrientNet

# The next slides will take you through NutrientNet: Potomac



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Links >>

∂Go.



# Signing Up for NutrientNet

>> My NutrientNet  User name: Password:	Home > My NutrientNet	> Sign up	» My NutrientNet	» About Project » Markets » Support
Login (Sign-up	About NutrientNet Markets Support	Create a new accou		
		Login information :  User name :  Password:  Confirm password:	* required fields  *  *  *	Market information :  Market: Potomac river basin  Role: Point source  Farmer
		Personal information:  E-mail:  First name:	* Address:	* required fields
		Last name: Occupation: Phone:	State: Zip code: Country:	United States
				* required fields  number: 4 3 5 7 7 2  e the number on the right for the code)
:X\.	Done	Sign up   Reset		

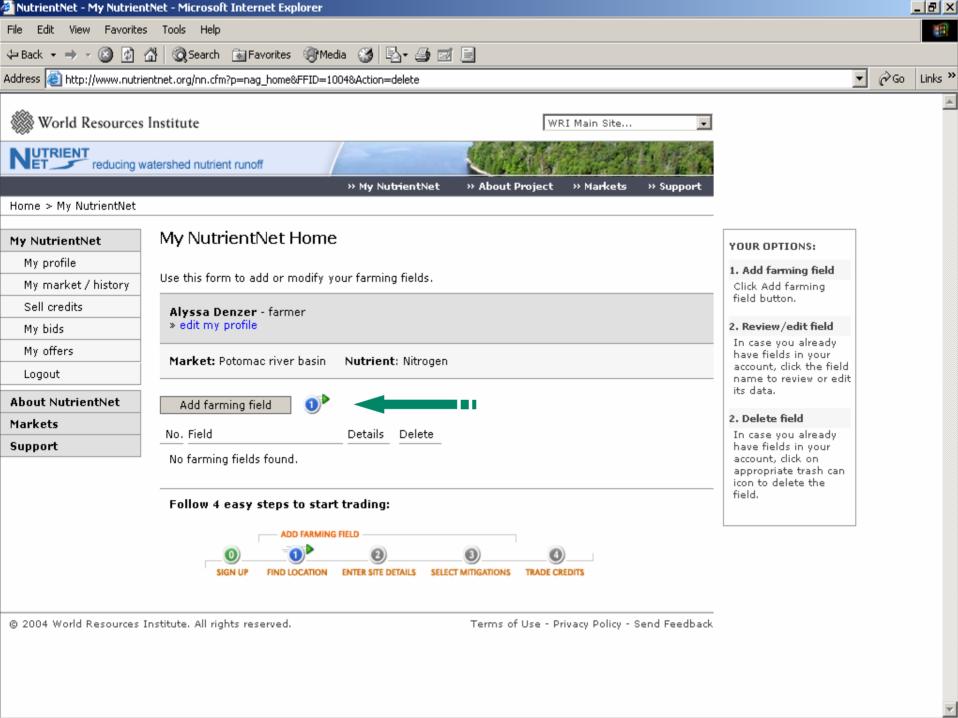


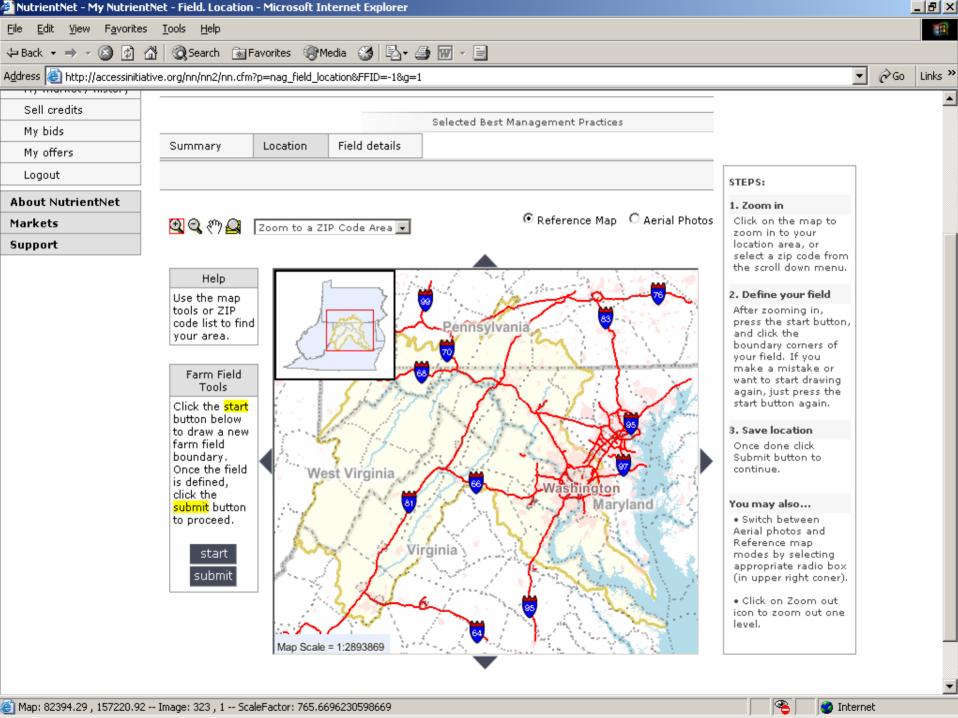


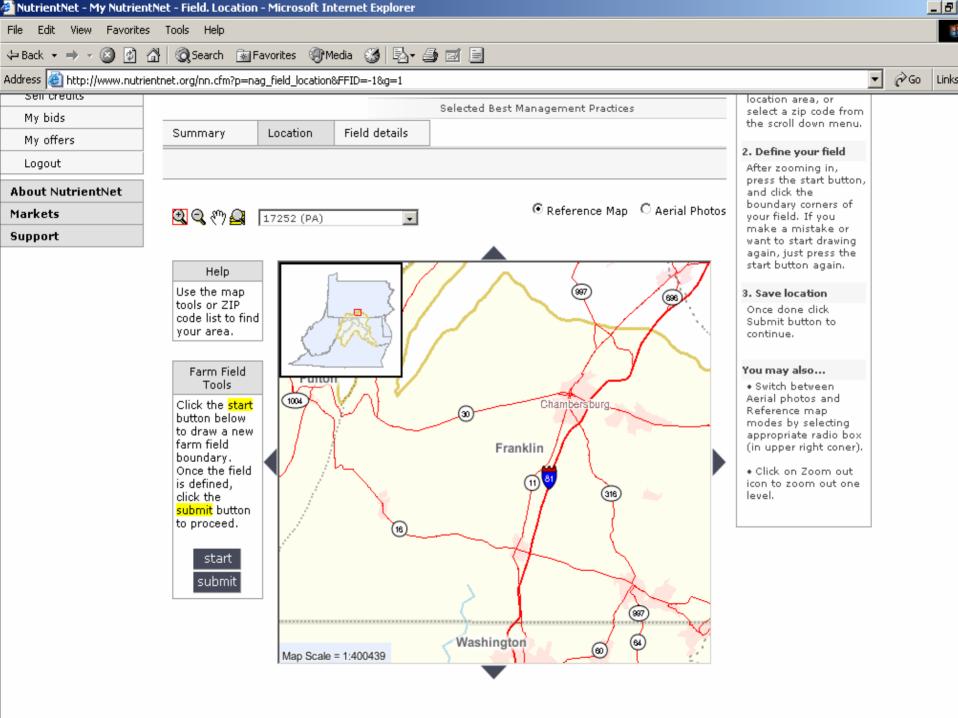
#### NutrientNet as a Farmer

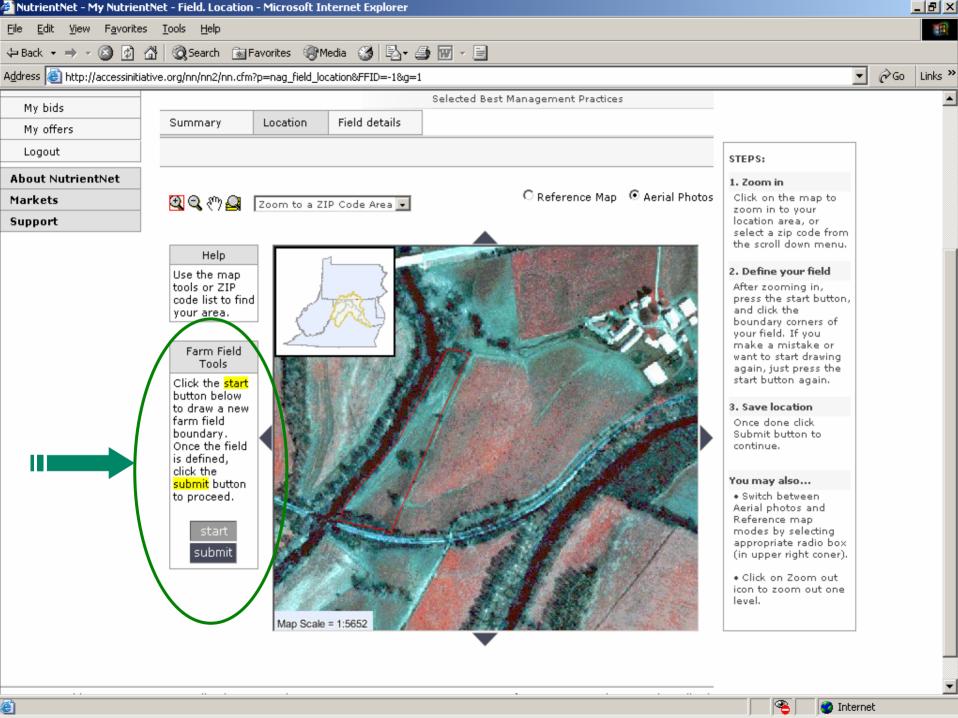
First we will review *NutrientNet* from a Farmer's perspective:

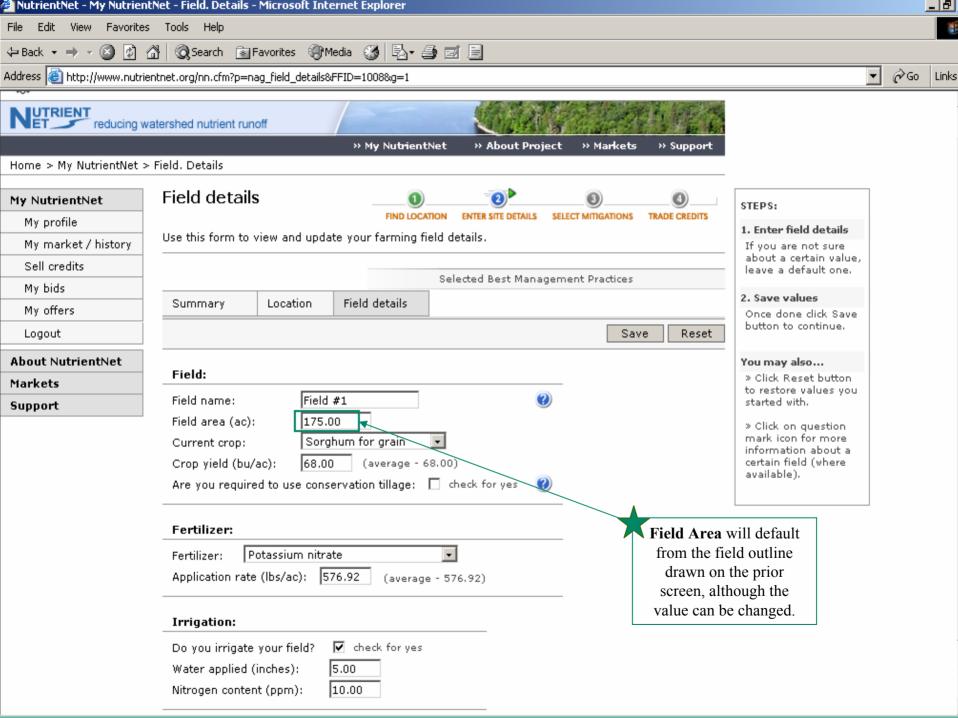
Market i	information :
Market:	Potomac river basin 🕟
Role:	C Point source
	● Farmer
	● Farmer

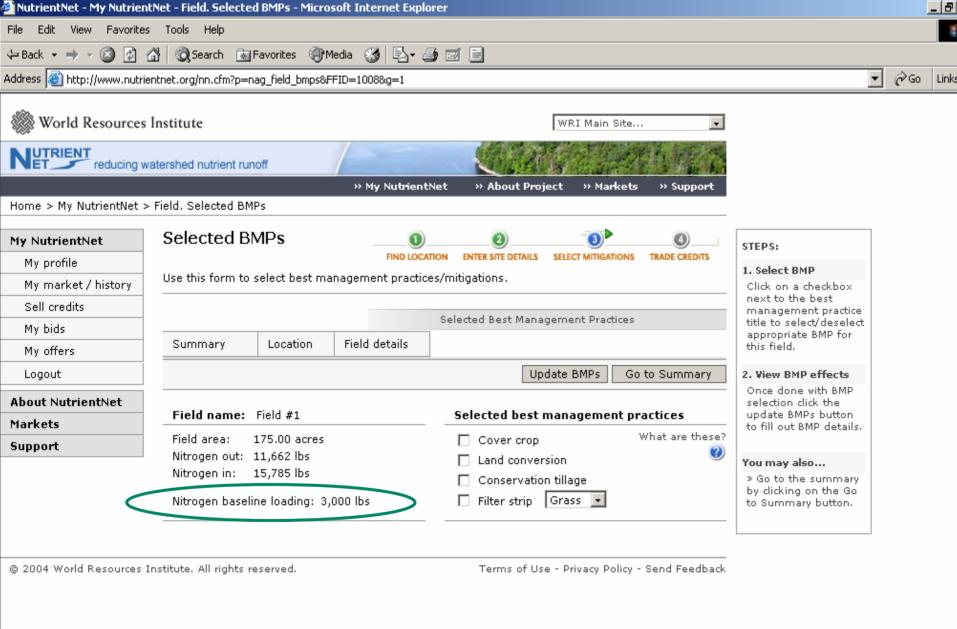


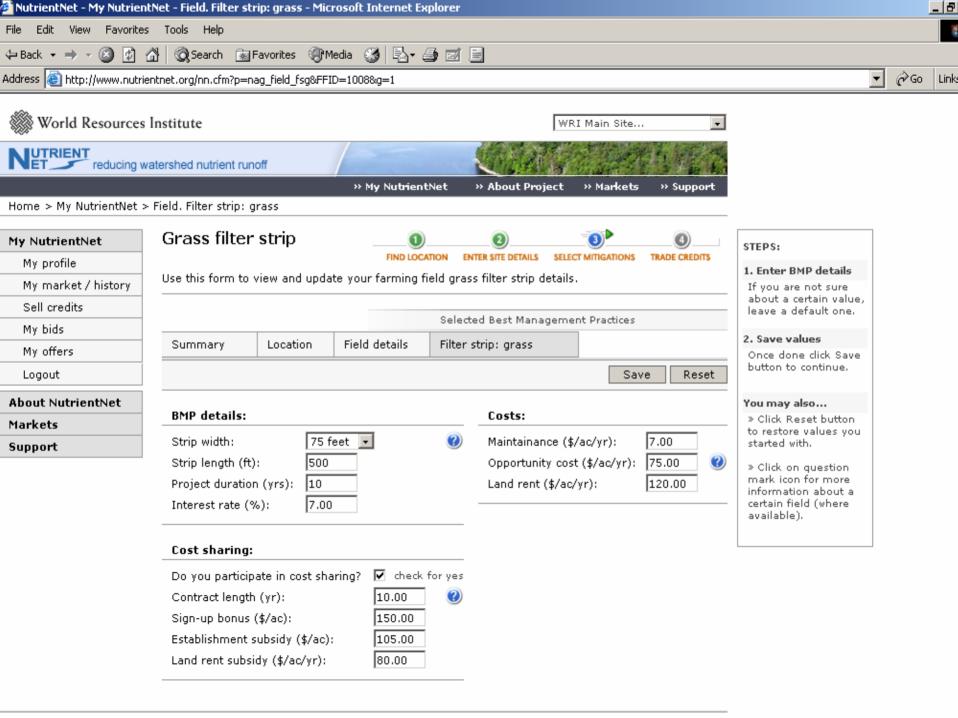


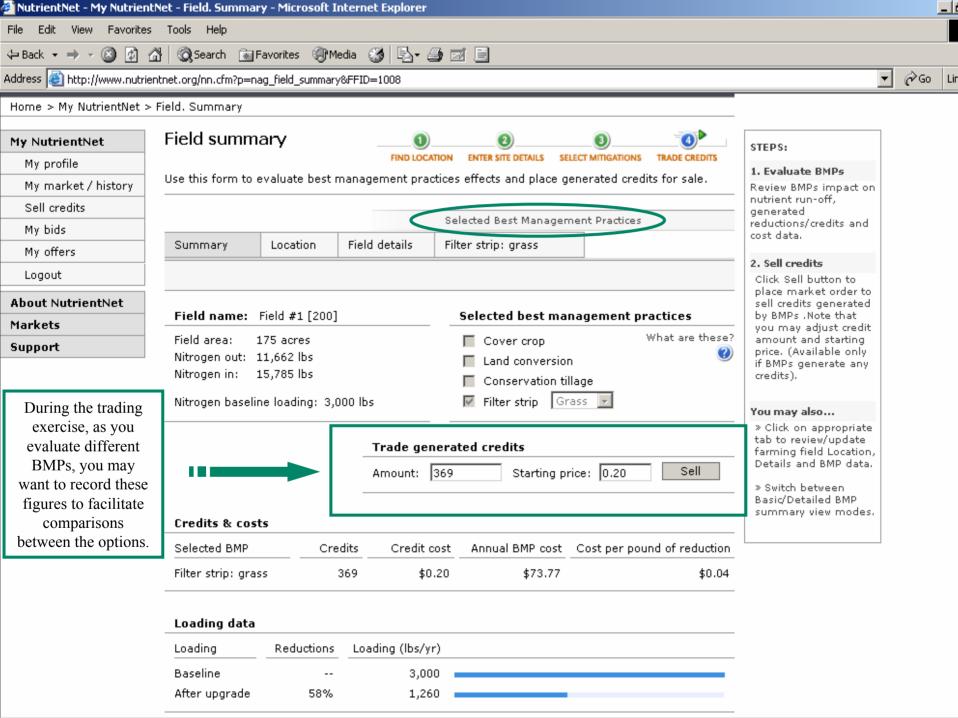


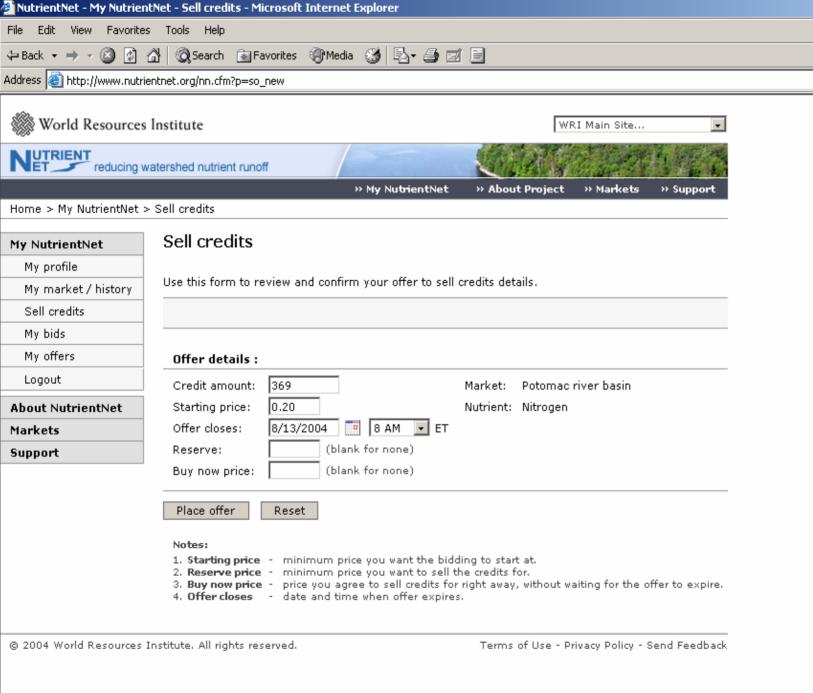






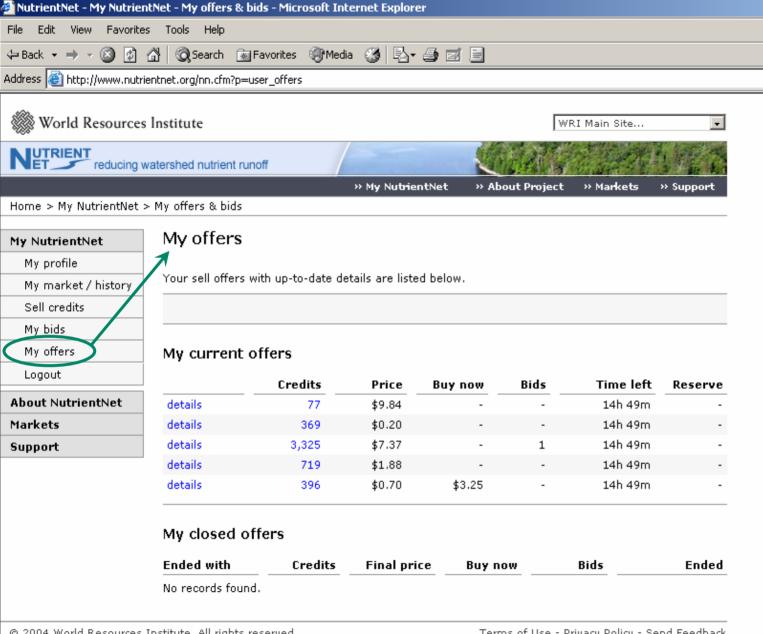






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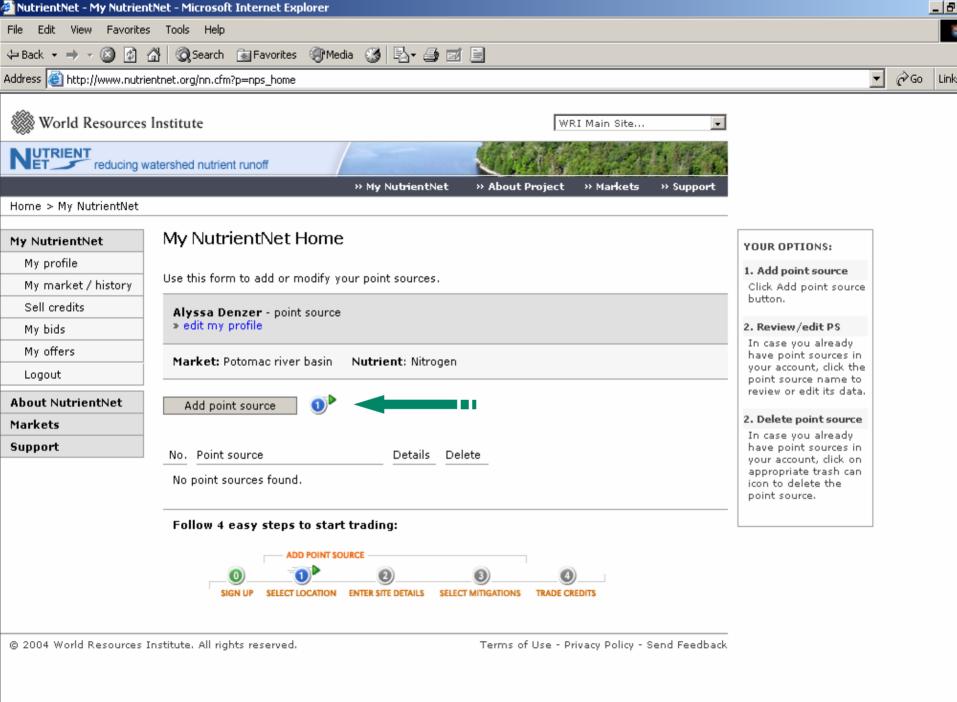
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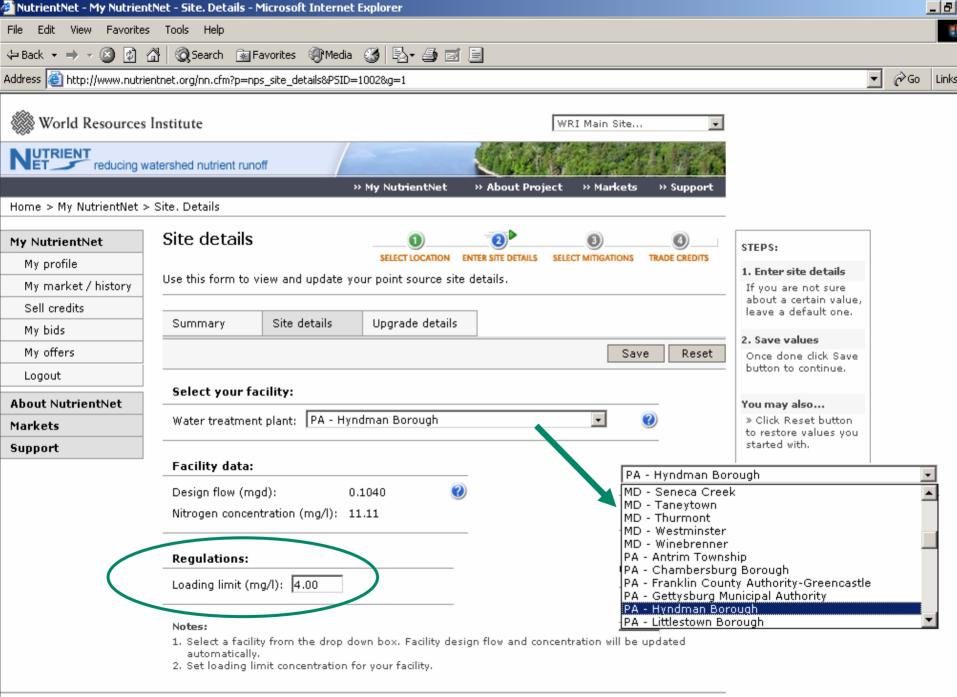


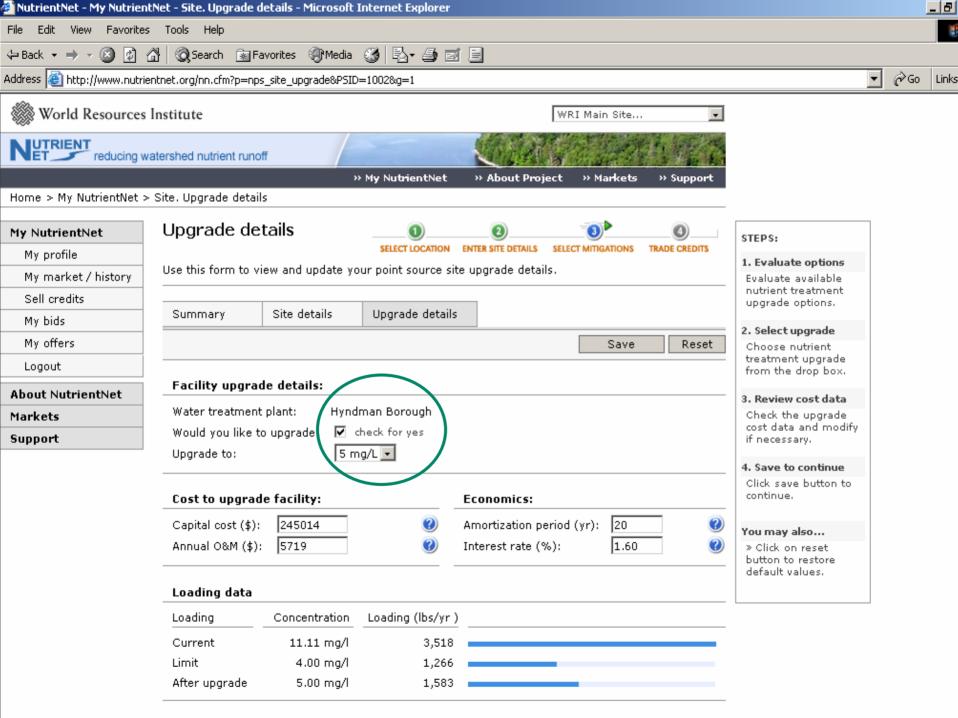
#### NutrientNet as a Point Source

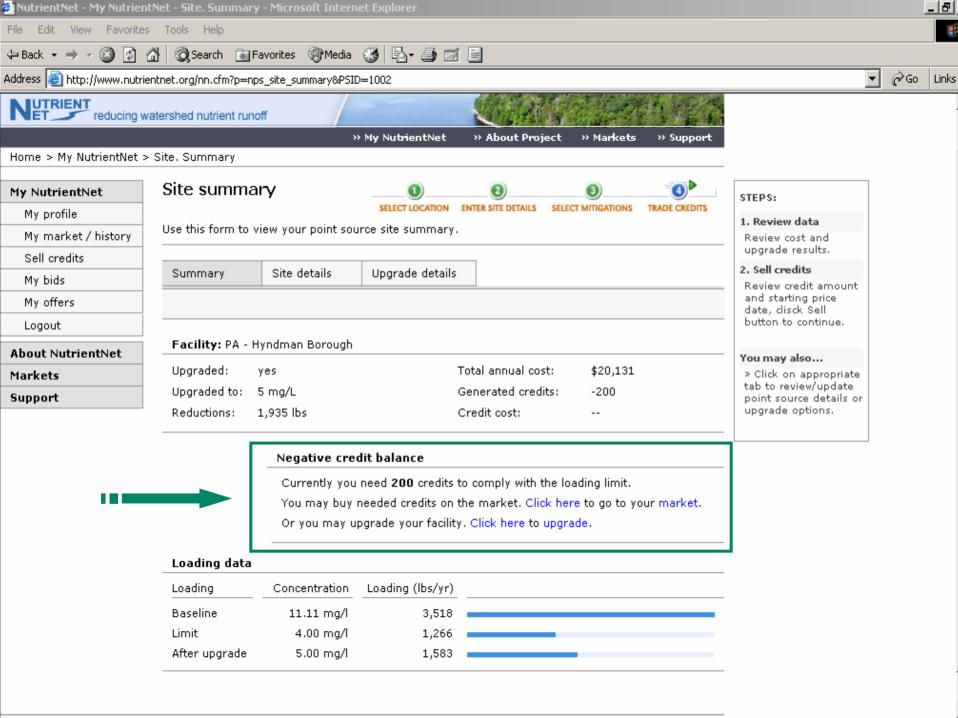
Now let's take a look at the NutrientNet site from a Point Source's perspective, as defined by the user profile:

Market:	Potomac river basin	
Role:	Point source	
	C Farmer	











#### Viewing the Market

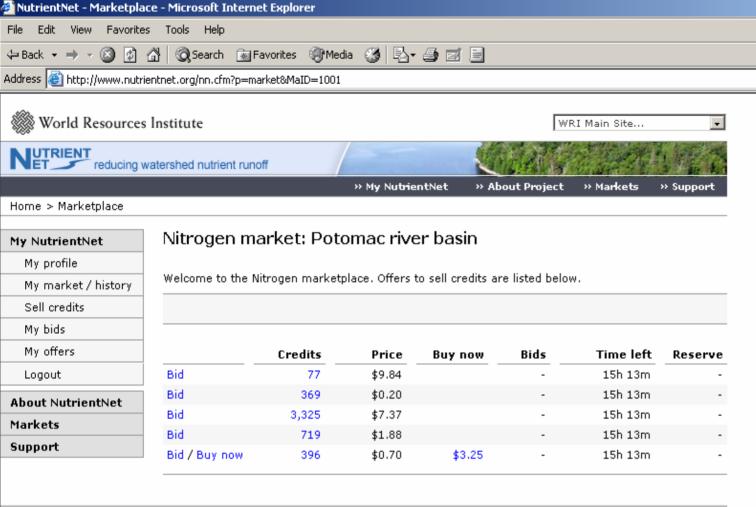
- After establishing that the Point Source will need to buy credits, the next step is to view the **Market**
- My Market displays credits for sale and current bids

#### Negative credit balance

Currently you need 200 credits to comply with the loading limit.

You may buy needed credits on the market. Click here to go to your market.

Or you may upgrade your facility. Click here to upgrade.



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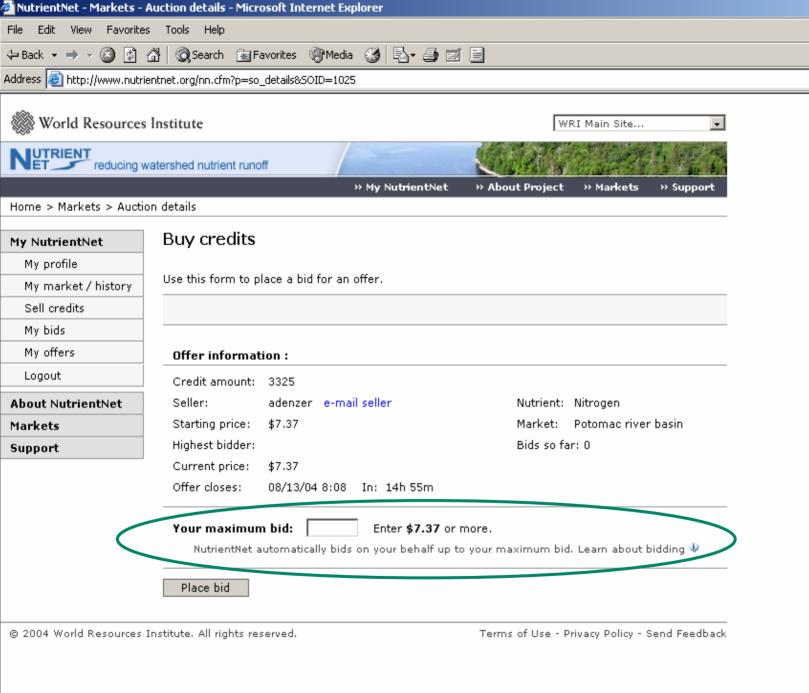
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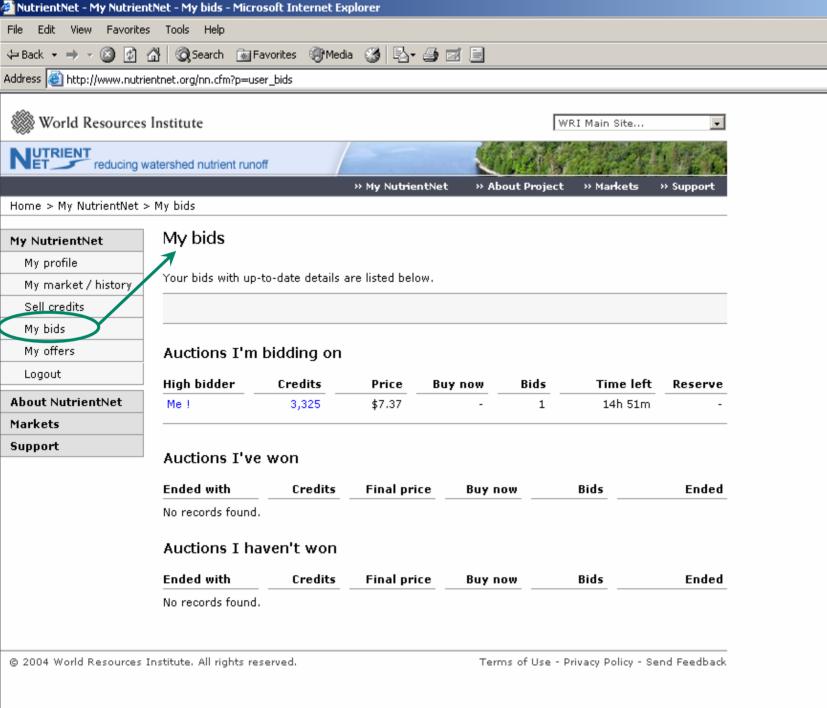
Links

∂GO.

My Market is accessed either via the link shown on the previous slide, or via clicking My Market on the sidebar to the left.



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Links

∂Go.